18-04
Question 117
0.19-59%

In figure 1, two speakers, A and B, are driven by the same oscillator at a frequency of 170 Hz and face each other at a distance of 2.0 m. What is the number of minima along the line joining the two sources? [Consider only the nodes between the two sources.] [Take the speed of sound in air = 340 m/s]
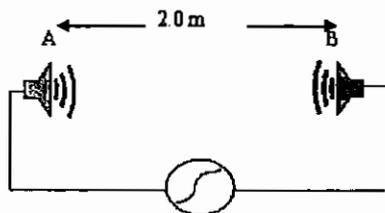

Figure 1

(a) 2
(b) 4
(c) 1
(d) 5
(e) zero

18-04
Question 118
0.41-71%

Two equal waves, of wavelength 4 m and amplitude A, are produced by two sources S1 and S2 as shown in figure 1. S1 is at a distance of 3 m from point P and S2 is at a distance of 5 m from P. When the sources are operated in phase, what is the amplitude of oscillation at P?
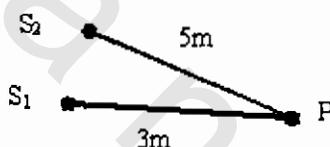

Figure 1

(a) $3*A/2$.
(b) zero.
(c) $A/2$.
(d) $2*A$.
(e) A.

18-5	Intensity and Sound Level

18-05
Question 119

Find the ratio of the intensities of two sound waves if the difference in their intensity levels is 7 dB.
(a) 3.
(b) 7.
(c) 5.
(d) 1.
(e) 9.

18-05
Question 120

A tone has a frequency of 1800 Hz and intensity level of 110 dB in air. What is the amplitude of oscillation of air molecules. [Density of air = 1.21 kg/m**3, speed of sound in air = 343 m/s].
(a) $3.54*10**-8$ m.
(b) $1.81*10**-10$ m.
(c) $2.03*10**-12$ m.
(d) $2.57*10**-9$ m.
(e) $1.94*10**-6$ m.

Question 121
The intensity of sound waves at 5 m from a speaker vibrating at 1000 Hz is 0.5 W/m**2. Determine the dislacement amplitude of the particles in the wave at that location (5 m away from the speaker). (The density of air = 1.3 kg/m**3 and the speed of sound in air = 340 m/s).
(a) $2.3*10**(-7)$ m
(b) $1.2*10**(-5)$ m
(c) $6.5*10**(-6)$ m
(d) $7.6*10**(-6)$ m
(e) $9.5*10**(-7)$ m

Question 122
A source of sound (1000 Hz) emits uniformly in all directions. An observer 3.0 m from the source measures a sound level of 40 dB. Calculate the average power output of the source.
(a)   2.87 micro-W
(b)   0.34 micro-W
(c)   10.5 micro-W
(d)   5.23 micro-W
(e)   1.13 micro-W

Question 123
Consicer two sound waves A and B propagating in the same medium. Find the ratio of the intensity of the sound wave A to the intensity of the sound wave B if the sound level of wave A is 20 dB greater than the sound level of wave B.
(a)   20
(b)   15
(c)   5
(d)   10
(e)   100

Question 124
A certain sound level is increased by 30 dB. By what factor is the intensity increased?
(a)   900
(b)   2700
(c)   300
(d)   1000
(e)   30

Question 125
Determine the intensity of a harmonic longitudinal wave with a pressure amplitude of $8.0*10**(-3)$ N/m**2 propagating inside a tube filled with helium. (For helium: density = 0.179 kg/m**3 and speed of sound waves = 972 m/s.).
(a) $1.8*10**(-7)$ W/m**2.
(b) $9.2*10**(-8)$ W/m**2.
(c) $1.5*10**(-6)$ W/m**2.
(d) $3.7*10**(-7)$ W/m**2.
(e) $4.6*10**(-8)$ W/m**2.

18-05

Question 126

A group of students, in a class room, produce a sound level of 53 dB. A single students speaking normally produces a sound level of 40 dB. How many students are in the room? (Assume each student in the group speaks at the same level as did the single person.)
(a)   13.
(b)   20.
(c)   30.
(d)   10.
(e)   5.

18-05

Question 127

If the distance from a source of sound increases by 1 meter, the sound level is decreased by 2 dB. Assume the loudspeaker that is emitting this sound emits sound in all directions. The original distance from the sound source is:
(a)   12.0 m.
(b)   3.86 m.
(c)   7.72 m.
(d)   1.93 m.
(e)   9.93 m.

18-05
0.52-41%

Question 128

A $1.5*10**(-6)$ W point source emits sound waves isotropically. What is the sound level 2.5 m from the source?
(a)   30 dB.
(b)   55 dB.
(c)   39 dB.
(d)   43 dB.
(e)   16 dB.

18-05

Question 129

A sound source located at the origin emits sound with an average power of 0.04 W. Two detectors are located on the positive x-axis. Detector A is at $x = 3.0$ m and detector B is at 5.0 m. What is the difference in sound level between A and B?
(a)   2.2 dB
(b)   3.3 dB
(c)   4.4 dB
(d)   5.5 dB
(e)   1.1 dB

18-05

Question 130

You are standing at a distance D from a point source of sound wave. You walk 30.0 m toward the source and observe that the intensity of these waves has doubled. Calculate the distance D.
(a)   15 m.
(b)   102 m.
(c)   493 m.
(d)   232 m.
(e)   300 m.

Question 131   0.26-20%
Which of the following statements is CORRECT ?
(a)   The power transmitted by a sinusoidal wave on a string decreases with increasing
         frequency of the wave.
(b)   The speed of sound is the same in all media.
(c)   Sound waves can travel in vacuum.
(d)   The power intercepted by a sound detector does not depend on the area of the detector.
(e)   Electromagnetic waves can travel in vacuum.

Question 132   0.44-26%
A point source of a sound wave has a power of 0.50 W. At what distance from the source will
the sound level be 90 dB ?
(a)   34 m
(b)   8.9 m
(c)   80 m
(d)   6.3 m
(e)   40 m

Question 133   0.42-26%
The intensity of sound wave A is 100 times that of sound wave B. What is the difference
between their sound levels ?
(a)   20 dB
(b)   10 dB
(c)   2   dB
(d)   100 dB
(e)   3   dB

Question 134
If an observers distance from a point source is doubled, the sound intensity level will be
(a)   increased by 6 dB.
(b)   decreased by 4 dB.
(c)   decreased by 6 dB.
(d)   decreased by 36 dB.
(e)   increased by 36 dB.

Question 135
Two waves are given by the equations:
         $y1(x,t) = 5.0 \sin(0.25 x + 75 t)$
         $y2(x,t) = 10.0 \sin(0.50 x + 150 t)$
where x and y are in meters and t is in seconds. The intensity ratio of $I1/I2$ of the two waves
is:
(a)   1/16.
(b)   1/2.
(c)   1/3.
(d)   4.
(e)   1/4.

Question 136

The ratio of the intensities of two sound waves is 5. Find the difference in their intensity levels.
(a)   1 dB.
(b)   4 dB.
(c)   7 dB.
(d)   6 dB.
(e)   2 dB.

Question 137

A person closes his windows to reduce the street noise from $10^{**}(-4)$ W/m**2 to $10^{**}(-8)$ W/m**2. What is the change in the intensity level in dB?
(a)   - 60.
(b)   - 20.
(c)   - 40.
(d)   40.
(e)   20.

Question 138

A point source emits 30 W of sound. A small microphone has an area of 0.75 cm**2 is placed 10 m from the point source. What power does the microphone receive?
(a)   30 micro-W.
(b)   0.1 micro-W.
(c)   9.3 micro-W.
(d)   1.8 micro-W.
(e)   3.6 micro-W.

Question 139

At a distance of 5.0 m from a point source, the sound level is 110 dB. At what distance is the sound level 95 dB?
(a)   7.1 m
(b)   5.0 m
(c)   14 m
(d)   28 m
(e)   42 m

Question 140

A point source emits sound isotropically. At a distance of 3.00 m from the source, the sound level is 90.0 dB. What is the average power of the source?
(a)   12.6 mW
(b)   56.5 mW
(c)   28.3 mW
(d)   113 mW
(e)   315 mW

Question 141

The intensity of sound wave A is 800 times that of sound wave B at a fixed point from both sources. If the sound level of sound A is 110 dB. What is the sound level of wave B:
(a)   690 dB.
(b)   555 dB.
(c)   7.3 dB.
(d)   50   dB.
(e)   81   dB.